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VII.—*Some Account of the* Actiniadæ *found upon the Coast near Teignmouth, Devon.* By Robert C. R. Jordan, M.B. Lond., Med. Tutor and Professor of Comparative Anatomy, Queen's Coll. Birmingham.

During the month of April of the present year (1854), aided by other members of my family, I undertook to investigate the various species of *Actiniæ* and the allied genera found upon the coast near Teignmouth. Although several kinds were already known to us by sight, we were fortunate enough to find more species than we had anticipated. The part of the coast examined extended from the small rocks between the beach at Dawlish and the Warren on the one side, to the rocks bounding the Torre Abbey Sands on the other. This includes rather more than ten miles of the coast. The actual localities explored within this district were but few, and none of these could be looked upon as exhausted; indeed it would not surprise me in the least to find at a future visit fresh species even in those very portions of the coast to which we have given the most attention. The hunting grounds were formed, in all except one place, by masses of red sandstone, which, detached at some former time from the cliffs above, are now overgrown with Fuci, and submerged at high water; some, indeed, being only exposed to the air in a low spring tide. In the single exception to this, the rocks on the Meadfoot Sands near Torquay, the only difference was the substitution of masses of limestone for the red sandstone of the other localities.

The first species I shall notice is the very common *Actinia Mesembryanthemum*. The division of the genus *Actinia* into two groups, in one of which the skin is smooth, and in the other studded with porous warts, is useful in determining the various kinds; it will therefore be adopted in the following sketch.

Actinia.

Div. I. *Skin smooth.*

α. Conspicuous tubercles on the margin of the oral disc.

1. *A. Mesembryanthemum.*

Abundant in every locality examined. Though specimens may be found of almost every shade of colour, there are yet three marked varieties which admit of description. The first (var. *α.*) is when full-grown much larger than either of the other two: the example figured by Dr. Johnston as the largest ever seen by Mr. Cocks is by no means of unusual size. The ground colour is of a rich red, which is thickly studded with spots of a lively emerald-green. The oral tubercles are bright blue, and the disc is encircled with a narrow line of the same colour. The tentacles are red, generally slightly paler than the body. The second variety (var. *β.*) is, with the exception of the tubercles and the blue line around the disc, of a uniform red, and the third (var. *γ.*) is, with the same exceptions, of an olive-green colour.

This Anemone serves well to prove that colour alone must not be taken as a guide to the determination of species amongst the *Actiniæ*. We met with some striped with green or blue, others entirely of a pale lilac, of an emerald-green, or even of a blue colour, whilst some are of so dark a red as to be almost black. The most marked of these varieties were found on the Shaldon side of the river Teign, rather further on than the Ness Rock. The paler specimens were on the under surface of stones, and were probably etiolated for want of light.

On the rocks by the "Breakwater" at Teignmouth, we found a double monstrosity of this species, two Anemones but only one disc. This is not rare amongst the *Actiniæ*.

This species is hardy enough to bear almost any treatment. Some which we have long had in our possession have more than once given birth to young; these are extruded by the mouth. The very young *Actiniæ* differ in their lighter colour, and in possessing a far less number of tentacles, which are also of greater proportionate length. The tubercles also are not conspicuous in the very young. Some have been sprinkled with green even at birth. This species can scarcely be confounded with any other. It expands freely, but perhaps more in the daytime than the night. It is sluggish in habit, but occasionally moves by elongating the disc in the direction towards which it is advancing. In contraction it never becomes much adpressed, but always retains somewhat of a conical form. Its

body sometimes swells out by imbibition, so as to become semi-transparent; this is probably more the effect of some change in the specific gravity of the water, than through the power of the animal. It generally happens if fresh water be added. When so swollen out, the septa between the chambers are plainly visible from beneath.

β. Without conspicuous tubercles.

2. *Actinia alba.*

A pretty and quiet little species, rare with us, or more probably not easily found from its lying so flat to the rocks when in a contracted state; and this is in itself enough to recognize it from *Troglodytes*, an abundant inhabitant of every rock-pool. The specimen of *A. alba* from which the following description was taken, had been in our possession more than a year, during which time it had never moved in the slightest degree. Wishing to prop up an injured specimen of another species, the hollow niche of the stone which formed its home was partially filled up with fine sand. This annoyed the hitherto stationary Anemone, and it at once began to take a walking tour, moving along with tolerable rapidity by the usual mode of progression, namely the elongation of the disc. Any other mode of locomotion is undoubtedly rare amongst the *Actiniæ*. It was long before the poor little Anemone could settle down to its former life, or find a comfortable resting-place. It seldom even expands except at night. During the time in which it has remained with us, it has not apparently increased in size at all. When laid flatly on the rock as in contraction it is not quite half an inch in diameter, and when expanded it does not measure as much as this, even including the tentacles in the admeasurement. It generally lies perfectly flat upon the surface of the stone, like a thin gelatinous crust; in its thickest part only raised about a line from the rock. It is then of an oval form, and the aperture at the oral disc not round, but linear; it is of a cream colour, with about twelve whiter lines stretching from the centre to the circumference; between these are other lines, but not so broad and not extending the whole way. The first lines probably indicate the divisions of the ovarian chambers. When expanded it becomes very pretty, its body is cylindrical, and from the summit radiate the tentacles, forming a most beautiful circlet something like a daisy. The tentacles are filiform, in three or four rows, much more slender and proportionately shorter than in the next species. Their colour is white, with three narrow dark rings. Within the tentacles is a circle of yellow, and inside this again a white ring surrounding the mouth, which rarely expands so fully as to be quite round. Our specimen certainly

did not possess "the three rows of minute white tubercles on the oral disc externally," as described by Mr. Cocks.

It was found not very far from high water mark, but completely buried beneath the sand.

3. *A. Troglodytes.*

Very abundant, and apparently found all along the coast; three or four may generally be seen in every rock-pool; its time of expansion is the light and sunshine. The tentacles and oral disc are the only parts usually visible, and these are seen studding the bottoms of the little shallow pools like stars; but if the Anemone be touched, it disappears entirely. Their bodies are either buried in the sand, or else hidden amongst the small mussels which coat the rocks. If taken off by a wedge and hammer carefully, so as to leave their base still fixed to the stone, they will live very well in confinement. It would be a slander upon those we have kept to say that they rarely expand, as they are generally fully open during the daytime; nor are they inactive, often shifting their position.

The body of this *Actinia* is gray, with sometimes a very slight tinge of olive, sometimes almost dirty-white; always marked with lighter longitudinal stripes, which radiate from the oral aperture to the disc. When contracted it assumes a beehive shape, but it has the power of becoming more flat than this.

In expansion, the ground colour of the part within the rays is white; the oral aperture either oval or round, with a narrow buff margin; outside this is a circlet of white dots (in those we counted, twelve in number); each of these has a dark border which makes them conspicuous. From these seemed to radiate the first row of tentacles, and from the interspaces a second and deeper row arise. Outside these dots is a white ring, broad and margined by another circlet of buff, bordered by a line of black, outside which is another broad ray of white, forming the base of the free portion of the tentacles. The remaining portion of these are of the same gray as the body, except that they are slightly lighter towards the tip. The markings do not always follow the exact pattern here given, but are subject to slight variety. The tentacles are thick in proportion to the size of the Anemone, and nearly equal the body in length.

In the description given by Dr. Johnston, the tentacles are said to be "in two not very regular circles;" they appear to me to be rather quadriserial; but (as pointed out by Holland in the 'Annales des Sciences') in any species of *Actinia* with numerous tentacula, they are often not exactly on the same plane, so that it is almost impossible to say how many rows they do form.

Thus *Troglodytes* might be said to have two series, the alternate ones being always on a lower plane; or it might be described as having four series. From this, and from the number of rows varying with age, this character seems to me of little value in the determination of species.

A large variety of this kind, or perhaps a distinct species, occurs sometimes, thrown upon the Teignmouth beach after storms. The body of the specimen from which the following description was taken is of a uniform gray colour, with a tinge of buff. It is twice the usual size of *Troglodytes*, and in contraction assumes the same hemispherical form, though the body is a little more elongated. In expansion it is cylindrical, but the form changes much, sometimes becoming much lengthened, and at others being constricted in the middle, so as to put on somewhat of an hour-glass shape. When expanded the mouth is seen to be surrounded by a circle of yellow, bounded by a dark line, and outside this is another yellow border, which is ended by a wavy irregular line of blackish-brown; this may be said to mark the commencement of the tentacles. Outside this waved line is a broader ring of black. If the appearance of these with regard to one tentacle be described, the broader line forms the base of two triangular figures, of which the waved line forms the sides, the angle subtending the base pointing towards the centre of the disc. Beyond this the tentacles are white, with three rings of grayish-brown, and tipped with the same colour at their summit. They are numerous, arranged in four rows, thick, and proportionately shorter than in the typical *Troglodytes*. Though the description and appearance of these two are very much alike, there is an indescribable difference between them, which makes me unwilling to regard them as certainly the same. The larger variety expands only in the dark, and is found thrown upon the beach after storms. Both these facts make me regard it as a denizen of the deep sea. No species of Anemone would be less likely to be thrown upon the shore than *Troglodytes*, which so readily retires under the sand for shelter.

A. Troglodytes has been supposed to be the young of *Actinia crassicornis*; that this is not the fact can easily be proved by keeping them. We have had some nearly two years, and they are still *Troglodytes*.

4. *A. aurantiaca*, mihi.

A. parvula; corpus aurantiacum, cylindricum, vel, si contractum sit, conicum. Tentacula coloris ejusdem, sed fusco tincta, filiformia, corpore longiora, serie quadruplici posita, prope basin striga alba cincta.

Clearly distinct as a species from any other met with by us, and also from any other described either by Dr. Johnston or Gosse: it seems the least of the Anemones. We only met with them in one locality, and this was upon a rock underneath the "Ness." They were found on the 11th of April 1854: a large mass of stone had fallen at some previous time from the cliffs above, and was so supported by others that its lower surface was free. This shelf was thickly studded with acorn shells and sponges. Amongst these were numerous examples of this little *Actinia*, hanging pendent from the rock, in shape much like a rain-drop ready to fall. Their tentacles were not expanded, but on touching them they contracted still more, and speedily shrank in amongst the *Balani*, and were lost sight of entirely. By aid of a wedge three or four examples were procured, some of which are still living. They are, as before said, small, and, when contracted, of a conical form, but in expansion their bodies are usually cylindrical, and of an orange or rather almost salmon colour. The tentacles, which are numerous, very fine, and considerably longer than the body, seem disposed in four rows; they are not quite of so bright a colour, having a grayish tinge blended with the orange; near the base they are marked with a cream-coloured or whitish bar, which looks, when the whole series of tentacles are taken together, like a lighter circle. When contracted into a cone, the *Actinia* is of a deep orange, with a central spot of a deeper tinge.

5. *Actinia*, n. sp. ? *pulcherrima*, mihi.

This *Actinia* differs from the *A. rosea* of Gosse (p. 90, Devonshire Coast) chiefly in this, that the tentacles are not uniform in size and shape; however, I hope at some future time to examine the locality pointed out by him for *A. rosea*, and see if the two species be really distinct. In the mean time the following description will enable any one to recognize this Anemone, should it be again met with.

A. corpus cylindricum, album, et glabrum. Tentacula rosea, radiis quinque digesta, quatuor externis filiformibus, et tribus annulis fuscis vittatis, interno, tentacula duodecim crassiora habente, sed etiam rosea, et fusco variegata. Os album, striis fuscis ab eo divergentibus, inscriptum.

Found on the Warren near Dawlish (or rather amongst the rocks between the Warren and the Dawlish Beach). We met with only one example, in spite of a diligent search for more; it was found on the 28th of April. The disc was injured by the capture, yet it lived about six weeks in confinement, and

then indeed died, with many others, from an accidental impurity of the sea-water. When found, it had everything but the tentacles completely buried beneath the sand. These did not then form a perfect circle, but were star-like in form, and looked more like a small plant of *Delesseria hypoglottis* radiating from a centre, than anything else, though they were less scarlet and more rosy in tint. At our first glance we mistook the *Actinia* for some seaweed of this kind. It was attached at some depth beneath the sand, and shrunk-in the moment it was touched. After some trouble we succeeded in getting it, but were much disappointed in finding a dull white Anemone, shaped like a beehive, and without any trace of the rosy tentacles which but a minute before had looked so lovely; in fact, we could scarcely feel certain that we had secured the prize, the change in its appearance seemed so magical; however, when placed in sea-water, it soon again spread its rosy crown of tentacles.

In contraction this Anemone is of a dull white, which has however a somewhat transparent look. There is no mark or line on the whole surface. It expanded sufficiently to enable its tentacles to be fully seen. They are short in proportion to the body, and of a bright crimson lake colour; they are in five rows; the four outer of these are fine, almost filiform, and of these rows the outermost seems the shortest, but this may be only from the incomplete expansion; each tentacle has three rings, as if a single shade of gray-brown was painted on the crimson ground; between these rings the colour is slightly lighter than elsewhere. Within these four rows of fine tentacles is another circlet of twelve, much thicker than the others, also rose-red shaded with brown, but almost conical in shape. The oral disc is white, with radiant dark lines.

It never completely expanded during its life in confinement, probably owing to the injury it had received. The tentacles were during this time always spread in a circular form, and it never put on the star-like shape which it had when first seen. The sun was then shining brightly into the pool in which it was found.

With this species ends my account of the first great group of the *Actiniæ*. We now pass to the second, or those provided with porous warts.

Div. II. *Skin more or less covered with porous warts.*

6. *Actinia parasitica.*

Very common indeed upon the shore after storms, and generally found attached to whelks. It is of large size, and assumes in contraction a beehive, or else a cylindrical form. The skin

is almost leathery to the feel. The prevailing tint varies from a light yellowish to a deep purplish-brown, with yellow and red spots. It is darker at the base than towards the apex, the upper part of the Anemone being often of a straw colour; it has always about twelve broad longitudinal yellow bands running from the apex to the base; there are also narrow yellow stripes between these, running from the base and gradually losing themselves. The oral disc is white; the tentacles though not long are filiform, and very numerous, in five or six rows; they are white, with the exception of a line of darker spots on each side of the upper surface of the inner row. In some specimens I believe the spots extend to all the tentacles, or the tentacles may even be ringed with black. The most remarkable feature in this *Actinia* is the single circlet of large porous tubercles which surrounds the body, about one-third of an inch from the base. These are only seen when the animal is expanded; there is apparently one aperture for each ovarian chamber; they are slightly darker in tint, raised and perforated in the centre. It has the power of ejecting water from them, and thread-like filaments are often to be seen protruding from their orifices.

This Anemone inhabits the deep sea, and is only thrown up after stormy weather, when abundance of specimens are to be found: they do not live well in confinement. The figure in Dr. Johnston's work gives an excellent idea of this species, but I have searched in vain for the rows of small glands near the summit. The single ring of large glands near the base is omitted, but these are not always visible.

7. *Actinia clavata** (Thompson); var. *rosacea* (Gosse).

This specimen was taken from a hole in one of the sand masses formed by *Sabellæ*, amid the rocks beneath Torre Abbey. It had no sand adhering to it, and was taken without injury and remained for a long time in excellent health. Its base is of a reddish-orange colour, thickly punctured with fine red spots; this shades off into a much lighter colour towards the mouth, where the ground is of a straw colour, but here there are distinct rows of brilliant red spots, some of which even extend up the under surface of the tentacles; these are probably porous. When the Anemone is contracted, it is of a semiglobose form, and the colour is then more intense than in expansion, but the tint is always darker at the base than towards the upper portion of the body. In expansion it becomes very much longer, but the base is always the broadest part, and never under any cir-

* Kindly named, from the description given above, by Mr. Gosse, to whom the account was referred.

cumstances does it assume the pedunculated form of *Actinia bellis*. In addition to the distinct rows of red spots there is another remarkable feature in this *Actinia*: the margin of the body at the oral disc does not end, as in most Anemones, in a smooth circle, but in a waved or crenate margin, and the rows of spots before described correspond to each crenature, one commencing at every salient fold. When expanded, the crenation of the margin is especially remarkable, so that it assumes the appearance of an external row of minute tentacles. The upper portion of the body then becomes of a pearly white, with a transparent glass-like look, the red spots being still very conspicuous; between each of these is a distinct line, but indicated rather by an indentation and consequent depth of shade, than by any actual change in the colour. When the Anemone is only in part expanded, the numerous tentacles are very much folded over each other, so as to give the appearance of two or three rows; yet when wholly spread, though never forming a circle, but always having some curiously waved outline, they are clearly seen to be disposed only in one row. The tentacles are large, and white in colour with a delicate shade of pink, they are also transparent; but their chief peculiarity is their long taper form, and in addition to this their being webbed or united at the base, so much that when fully spread their point of union extends beyond the margin of the disc. In complete expansion, as before said, the crenate margin of this superior disc much resembles an exterior row of small tentacles. The disc itself is white, except that around the mouth is a delicately waved pink line or border.

8. *Actinia coriacea.*

Met with in the two varieties of *A. coriacea* and *A. crassicornis*, in every place examined by us. It varies much in colour; the body may be of a rich dark red with white tubercles, or of a light pale green or even almost white. These Anemones are always found near low water mark, and though nothing can exceed their gorgeous appearance when fully expanded, there is yet something almost forbidding in their aspect. They do not live well in confinement, at least as far as our experience goes, nor do they afford much of interest. The coating of shells and sand is under these circumstances speedily thrown off.

9. *Actinia dianthus.*

This may also be dismissed briefly. It is only known to us as thrown upon the Teignmouth beach rather frequently during the storms of winter. The colour of the body varies in these

examples from light orange to cream colour. The description of the species in Dr. Johnston's work is very good, and the figure in the Rev. Dr. Landsborough's little popular work on 'Zoophytes' is very faithful. It is a lovely species and can scarcely be confounded with any other kind.

At the time of making these investigations we had not seen Mr. Gosse's interesting 'Rambles on the Devonshire Coast,' but under its guidance we may hope to find several other species, since he has met with them (as for example *Actinia bellis, A. anguicoma, A. rosea* (Gosse), and *A. nivea* (Gosse)) within the boundaries of coast here mentioned. There are also scattered in my note-book legends of other species of the genus, which it is to be hoped may some day ripen into certainties, but these are the only *Actiniæ* of which I can at present give a detailed description. Of other *Actiniadæ* the only kind we have found on the coast is,—

10. *Anthea Cereus,*

which is far from rare. We have once met with it in a sand-pool beyond the rocks at Teignmouth, and also on the sands below Torre Abbey, but its chief haunt is in the pools amid the rocks which separate the Dawlish beach from that of the Warren. It seems to be very gregarious in its habits, many always being found in the same pool.

It is a very lively and pleasant Anemone to keep, moving about with much activity, but always, as far as we have seen, by aid of the disc only. They often make the entire tour of their prison-house, and it is to be feared that sometimes these expeditions are of an aggressive character, for more than once have we had to rescue some lesser species from the grasp of their tentacles. I am sorry to confess this, for the *Anthea* is a favourite of mine; I would try, however, to defend him from another charge brought against him, namely that of stinging. Of course one affirmative declaration must outweigh any number of negative assertions, yet we have all frequently handled them, without experiencing any unpleasant sensation. The tentacles adhere very firmly to any object brought within their grasp, but scarcely more so than those of *Actinia coriacea.*

It lives well in confinement, and is amusing from its activity and from its constant changes of form. They sometimes attain a large size: one found in a pool amongst the Warren Rocks had the tentacles, when erect, almost of the calibre of a goose-quill, and must have been, when in full expansion, considerably more than an inch in breadth, exclusive of the tentacles. In the same pool were five other specimens, but all of smaller size. I have seen twenty even in a very little pool in the same locality.

They vary much in form; sometimes their bodies are elongated or cylindrical, with the tentacles hanging loosely around in graceful curves, and shortly after the Anemone may stand up a complete Briareus, with arms erect, spread out to search for prey; then, if ever, it would be supposed most likely to sting, but my fingers have often been within its grasp without any such effect. At other times its body is shortened and thick, and the tentacles have undergone the same change. It has the power of wonderfully altering the size and shape of these. They vary in number, though always numerous, and the animal can turn and twist them in any direction. It often curls them round at the points like crooks, sometimes enlarges them like clubs: as in many of the Anemones, the mouth of the *Anthea* is sometimes pouted.

The usual colour of this Anemone, as found with us, is—body of a uniform brownish olive, with the tentacles of a grayish colour, having also a longitudinal lighter stripe along the upper surface; sometimes, however, they assume a much gayer tint, and the brown hue of the body becomes more red, almost claret-colour, whilst the tentacles from gray are changed to emerald-green, and adorned with a bright ring of rose-colour at about half-way between their base and extremity.

It is difficult to account for the changes in the inhabitants of the rocks at very short distances of coast, and under apparently similar circumstances, but a very marked difference there decidedly is: this fact makes me, however, confident of fresh results from fresh researches. Mr. Gosse's book, and the works of other naturalists, prove indeed that there are many species yet unnoticed by us; there are some probably as yet unseen by any one. I would hope, therefore, that at some future visit more may be done, especially along the limestone portion of the coast, as this was only examined at one spot (Meadfoot Sands, Torquay), and there but very imperfectly.

Dec. 16th, 1854.

VIII.—*On a Monstrous Oyster Shell.* By George Busk, Esq.

[With a Plate.]

To the Editors of the Annals of Natural History.

Gentlemen, Greenwich, July 31, 1854.

The shell, of which the enclosed drawing (Pl. III. B. figs. 1 & 2. nat. size) will give some idea, was picked up, I believe, on the coast of Pembrokeshire.

It appears to be a very anomalous production, and as I do not